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The Navy Job Performance Measurement Program: Background, Inception, and Current Status

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This report details the inception and institutionalization of the Navy's job performance measurement project, part of the Congressionally-mandated Joint-Service Project. Specifically, this report traces the history of the Joint-Service effort to link enlistment standards to actual job performance data and includes a description of the current and future research efforts in this area. The job performance measurement project will provide the Navy with the capability to measure and predict job performance and will contribute to major improvements in personnel system functions and measurement technology.

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FOREWORD

The Navy Job Performance Measurement (JPM) Program is a product of the Navy Performance-Based Personnel Classification Project. Both efforts constitute significant contributions to the Joint-Service JPM Program, which can be considered a landmark research thrust of the armed services. This research has been funded through P.E. 63707N, Z1770.001, and reimbursable funds.

This report outlines the genesis and development of the Navy JPM Program and details the current status and planned efforts of that program. Information contained herein is intended to benefit both the research and the operational communities. Ultimately, the information generated by the project can be expected to benefit the armed services, military as well as civilian research communities, and applied industrial/organizational psychology in general.

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SUMMARY

Problem

The Navy, along with the other armed services, historically has not used a prediction of job performance to guide classification and assignment of recruits, even though on-the-job performance is the preferred criterion for setting enlistment standards. Instead, the services rely primarily on a prediction of success in entry-level training because training grades are easy to obtain. This problem is being addressed in the congressionally mandated Joint-Service Job Performance Measurement (JPM)/Enlistment Standards Project. The Project is investigating the feasibility of measuring job performance in a variety of ways and demonstrating the usefulness of this type of criterion information in setting enlistment standards.

Objective

The main goals of the Joint-Service JPM/Enlistment Standards Project are to measure job performance and to link enlistment standards to performance data. The Navy has begun research in several areas to support these goals. This report documents and summarizes the background developments that have contributed to the inception of the Navy's JPM program.

Synopsis

The Joint-Service Project had its genesis in congressional concerns that the Armed Services Vocational Aptitude Battery (ASVAB) was not being validated against eventual job performance. The project will develop both hands-on and surrogate measures of job performance. This research strategy has been endorsed by the Manpower Accession Policy Steering Committee and the National Academy of Sciences (NAS) Committee on the Performance of Military Personnel. At the present time, research is being conducted in 32 occupational specialty areas across the four services. This constitutes about 20 percent of the total enlisted Armed Forces.

The Navy's contribution to the Joint-Service Project is aimed at improving classification and assignment through the measurement of job performance. The initial Navy-planned research efforts were truncated due to budgetary constraints. Early Navy efforts focused primarily on measuring job performance for a small set of ratings. In subsequent years, the Navy program has been expanded in level of research funding and broadened in scope.

The current program will cover seven ratings that fit well in the Joint-Service effort because together they cover about 25 percent of the total Navy enlisted force, come from the top 26 critical Navy ratings, represent 5 of the 24 officially recognized occupational fields, and use 5 of the current 10 ASVAB composites that are in operation in the Navy's classification and assignment system. In addition, two original research tasks (i.e., development of a prototype JPM data base and demonstration of new computerized predictor tests) have become separate projects. If fully developed, the JPM data base can be used by the research community to guide criterion development and by the operational community to answer policy questions and guide decisions. The work on new predictors was to be conducted late in the life of the project, but new test development technology is progressing at a very fast rate. With the impending advent of the computerized ASVAB, there is an increasing amount of interest in evaluating new predictors to supplement this selection battery.

This report covers the history of the JPM Program and describes the current scope of the program as well as plans for the future use of JPM technology.

The JPM Program, if successful, will provide the Navy with the capability to measure and predict job performance. As noted by the NAS Committee, "If the services can develop substitutes from the same research base that compare favorably with hands-on measures, they will have criterion measures of continuing usefulness and will be able to set up a program of ongoing validity research" (Office of the Assistant Secretary of Defense; Manpower, Installations, and Logistics; 1984, p. 24). Such a program in the Navy will lead to major improvements in personnel selection and other personnel system functions and significant contributions to measurement technology in particular and applied psychology in general.

CONTENTS

INTRODUCTION

The Armed Forces need accurate enlistment screening and job placement to ensure training success, retention of skilled personnel, and mission performance. Suboptimal assignment of personnel to jobs can adversely impact readiness and result in critical skill shortages. High training costs, dissatisfied personnel and decreases in morale, productivity, and retention can frequently be traced to deficiencies in classification and assignment.

Problem

The general problem is that the Navy, along with the other armed services, has never used predictions of job performance to guide classification and assignment of recruits. This has not been done despite the fact that on-the-job performance is generally recognized as the best criterion for validating selection instruments and setting enlistment standards. Instead, we rely primarily on predictions of success in entry-level training, because this criterion measure is easy to obtain. The feasibility of measuring job performance and using this type of criterion information to set enlistment standards is being investigated in a Joint-Service Job Performance Measurement (JPM)/Enlistment Standards Project.

Objective

The main goals of the Joint-Service JPM/Enlistment Standards Project are to measure job performance and to link enlistment standards to performance data. The Navy has begun research in several areas to support these goals. This report summarizes the background developments that have contributed to the Navy's JPM program.

Background

Aptitude tests have been used to determine military enlistment since World War I, when the Army Alpha test was developed. As the state of the art of personnel research progressed, so did military aptitude tests. The latest selection instrument, the Armed Services Vocational Aptitude Battery (ASVAB), has been in use in various forms since 1976. All of the services use the ASVAB to assess applicant aptitudes and to classify and assign new recruits to occupational specialties (called ratings in the Navy).

OBJECTIVES OF JOINT-SERVICE PROJECT

- Develop prototype methodologies for measuring job performance
- Link enlistment standards to on-the-job performance

The ASVAB is a paper-and-pencil test of cognitive abilities that has been proven to predict training success but not on-the-job performance. It is widely recognized, however, that job performance should be the ultimate basis for validating selection instruments and setting enlistment standards.

Historically, training performance has been used to validate enlistment and classification standards because it appears to be a logical surrogate for later job performance. More importantly, training data are economical to collect and analyze. Training grades are based, for the most part, on paper-and-pencil tests that do not assess job skills. Moreover, training success, however, will always remain an inadequate validation criterion to the extent that it does not mirror the actual job environment or include all of the tasks performed in a job.

Validation of selection instruments by job performance data was not feasible until recent years for several reasons: (1) Hands-on performance tests for most military jobs were unavailable; (2) the acquisition and manipulation of required job-task information was prohibited by a lack of computer resources; and (3) the development, administration, and validation of job performance measures were fiscally unrealistic (Office of the Assistant Secretary of Defense; Manpower, Reserve Affairs, and Logistics (OASD, MRA&L), 1982a).

Validation using job performance data became feasible only recently due to advances in personnel research and computer technology. While test administration costs remain high, some developmental expenses are lower due to the existence of job analysis information for most occupations in the armed services. With a Joint-Service research strategy aimed at developing empirical substitutes for hands-on performance tests, it is now possible to undertake a Department of Defense (DoD) project to link enlistment standards with job performance. The Joint-Service Project represents the first research effort aimed at validating ASVAB against actual job performance.

This report is organized into four sections. The first describes the evolution and research strategy of the Joint-Service JPM/Enlistment Standards Project. The second covers the initiation of the Navy's JPM research efforts. The third section details the Navy's advanced development effort entitled "Performance-Based Personnel Classification." Finally, the fourth section describes the Navy's JPM program, future plans for JPM technology, and the anticipated end-products of the Navy research. Figure 1 provides an overview of the history and development of the Navy's JPM program.

1985 Performance-Based Personnel Classification Project expands and evolves into wider ranging JPM program.

Navy's Performance-Based Personnel Classification Project is initiated.

1984 NAS endorses goals and objectives of Joint-Service Project.

MAP Steering Committee endorses Joint-Service research strategy.

1983 Exploratory development funds are reprogrammed to support additional planning for JPM research.

JPM Working Group is established.

Joint-Service Project is formally launched.

1982 House Appropriations Committee tasks OASD to oversee Joint Service Project.

CLASP is implemented.

1981 House Armed Services Committee endorses Joint-Service Project.

Joint-Service Job Performance Measurement/Enlistment Standards Project is introduced.

Navy pilot studies are started.

OASD suggests validation of enlistment standards against job performance.

1980 Congress raises concerns about the adequacy of selection standards.

1976 ASVAB is implemented.

1973 PRIDE is introduced at Military Entrance Processing Stations.

Training performance first used to validate enlistment and classification standards.

1918 Army Alpha is developed.

Figure 1. The development of the job performance measurement program

THE JOINT-SERVICE PROJECT

The Joint-Service JPM/Enlistment Standards Project was brought about by several coinciding factors. The Conference on Joint-Service Efforts to Link Enlistment Standards and Job Performance (OASD, MRA&L, 1982a) identified the following major influences: (1) doubts about the adequacy of the selection process, (2) recognition that the supply of eligible enlistees is dwindling, (3) perception of a decrease in the quality of accessions, (4) concern about opportunities to increase and maintain manpower quality, and (5) advances in testing and performance measurement technologies.

Evolution of the Joint-Service Project

The Joint-Service Project had its origin in a 1980 memorandum from the OASD that identified the need to measure on-the-job performance and asked the services to validate enlistment standards against such performance (App. A contains this memorandum). Each service initiated pilot research in response to this request. In 1981, the House Armed Services Committee tasked the OASD to oversee a Joint-Service Project in the JPM area and to detail progress in an annual report.

The Joint-Service JPM/Enlistment Standards Project was formally launched at a conference at the Air Force Human Resources Laboratory, Brooks Air Force Base, Texas, in September 1982. The objectives of this DoD conference were to

1. Fully elaborate the concept, objective, and status of the Joint-Service JPM Project.

2. Present and discuss the proposed conceptual framework for this long-term project.

3. Review the status of relevant Army, Navy, Marine Corps, and Air Force research and development activities. (OASD, MRA&L, 1982a)

As a result, the Joint-Service JPM Working Group was established in October 1982. It is composed of technical and a policy representatives from each service and is chaired by a DoD Joint-Service Project Manager. Its charter is to review and coordinate the JPM research programs. As part of its mission, the Working Group shares research results and ideas, thereby eliminating unnecessary redundancy across service research programs. The group also makes recommendations on accession issues and ensures that service data collection efforts will obtain the information needed to link enlistment standards to job performance.

Management Oversight

An Annual Report to the House Committee on Appropriations, which details the ongoing JPM research, is the main document used by Congress to track progress. The JPM Working Group prepares this report and serves as the point of contact for two other oversight groups.

JOINT-SERVICE OVERSIGHT

- JPM WORKING GROUP
  Members: Technical and policy representatives from each service
  Chair: DoD Joint-Service Project manager

- MAP STEERING COMMITTEE
  Members: Senior military officers in personnel area and commander of MEPCOM
  Chair: Director for Accession Policy (OASD/MI&L)

- NAS COMMITTEE ON THE PERFORMANCE OF MILITARY PERSONNEL
  Members: Nationally recognized experts in performance measurement and selection standards
  Chair: DoD Manager (OASD/MI&L)

The Manpower Accession Policy (MAP) Steering Committee (formerly the ASVAB Steering Committee) is the major source of policy oversight for the Joint-Service Project. The steering committee is chaired by the Director for Accession Policy (OASD; Manpower, Installations, and Logistics; MI&L) and is composed of senior military officers in the personnel area and the commander of the military enlisted processing command (MEPCOM). The MAP Steering Committee reviews research progress from a manpower, personnel, and training perspective and ensures coordination of research and policy issues.

The National Academy of Sciences (NAS) Committee on the Performance of Military Personnel is composed of nationally recognized experts in scientific and technical areas related to performance measurement and selection standards, including personnel testing, industrial psychology, research design, performance evaluation, military occupational analysis, et cetera. The committee provides independent technical review of the Joint-Service Project, assisting DoD and the services in determining data requirements and strategies for linking enlistment standards to job performance.

Overall Research Strategy

During its first year, the JPM Working Group planned the Project research program. In broad terms, the plan calls for the systematic identification of a set of occupational specialties to serve as a test bed for investigating hands-on performance tests and selected surrogate, less expensive measurement instruments. Performance data are to be

related to ASVAB scores as part of a demonstration of the use of this type of criterion data, setting the stage for linking enlistment standards to job performance. This strategy was endorsed by the MAP Steering Committee during the summer of 1983 (App. B).

JOINT-SERVICE RESEARCH STRATEGY

- Select occupational specialties as a Joint-Service test bed.
- Develop hands-on performance measures.
- Develop surrogate measures to compare with hands-on measures.
- Analyze data to determine whether surrogate measures can be substituted for hands-on measures.
- Attempt to link performance measures with ASVAB.

The Joint-Service research strategy was reviewed by the NAS committee and the JPM Working Group at a workshop held at the end of 1983 (OASD, MRA&L, 1983). The specific objectives of the Joint-Service Project, as stated at the JPM workshop, were (1) to develop prototypic methods for measuring job performance; and (2) if possible, to link enlistment standards to on-the-job performance. Strategies for linking enlistment standards to job performance were not specified. The JPM Working Group assumed that the best way to structure the Joint-Service effort was to have each service conduct its own research, according to and in concert with Joint-Service guidelines.

Selection of Occupational Specialties

One of the first guidelines generated by the working group was a set of criteria for all services to use in selecting occupational specialties for their research programs. Six were identified: (1) The occupations should be of critical importance to each service; (2) there should be enough people assigned to them to ensure adequate sample size; (3) enough individuals in a specialty should be located on as few bases as possible in order to obtain an adequate sample without undue travel costs; (4) the important tasks within the occupational specialty should be measurable; (5) any problems within the occupational specialty (e.g., attrition) should be known and well documented; and (6) characteristics of the occupation should permit evaluation of the impact on minorities and women of the measurement techniques and data collection.

Each service used these criteria to select from 6 to 19 occupational specialties for study, agreeing to collect a common set of data inputs (e.g., ASVAB scores, training grades, etc.). In addition, each service agreed to act as the "lead service" in demonstrating job performance measures for one cross-service occupation.

Development of Performance Measures

The JPM Working Group also agreed that the following premises were central to the development of job performance measures: (1) The primary focus of measurement should be "manifest, observable job behaviors"; (2) the most direct measures of job behaviors should have the highest likelihood of meeting validity requirements; and (3) the hands-on job-sample test should have the highest fidelity to actual job performance and will, therefore, serve as the benchmark to which other, less direct measures will have to conform.

The major assumption of the Joint-Service Project is that occupational analysis and performance measurement has advanced to the point where hands-on performance tests are feasible and can be put to widespread use. The JPM Working Group, however, recognized that the cost of such tests would prohibit DoD-wide performance testing on the large scale required for validity research. Therefore, they devised a research strategy to develop less expensive, easier to administer surrogate measures that could substitute for hands-on measures. The procedure to be applied was to first develop a good hands-on test as a high-fidelity "benchmark" against which various surrogate measures would be compared.

Summary

The individual services are developing job performance measures within a common framework and will ultimately link these measures to enlistment standards. The essentials of the overall research strategy are (1) selection of an integrated set of cross-service and service-specific occupational specialties as a Joint-Service test bed, (2) development of hands-on performance measures for all of the occupational specialties selected, (3) development of surrogate measures to be compared with the hands-on measures, and (4) analysis of the data to examine the feasibility of substituting one measure for another and to establish relationships between the various performance measures and ASVAB.

In a report on the JPM workshop (Committee for the Performance of Military Personnel, 1984) and later, as part of a report to Congress (OASD, MI&L, 1984), the NAS endorsed the goals and objectives of the Joint-Service Project. The Committee also found the overall strategy adopted by the JPM Working Group to be reasonable and timely and were optimistic about the potential of the Project to improve the psychometric aspects of selection and classification:

> The psychological profession has long paid homage to the goal of measuring performance directly. But hands-on measures have not been used very much in actual practice because of the sheer difficulty of developing and administering such measures. The Committee thinks it important that this attempt is now being made. . . .The Committee supports the decision to develop both hands-on and surrogate measures. It makes sense to commit enough financial and human resources to give the hands-on test a real trial. There are few institutions in American society capable of doing so. At the same time, the state of testing

> technology is such that the hands-on test is likely to be too unwieldy and expensive to use on any continuing basis. If the Services can develop substitutes from the same research base that compare favorably with the hands-on measures, then they will have criterion measures of continuing usefulness and will be able to set up a program on ongoing validity research. (OASD, MI&L, 1984, p. 24)

At the present time, research is focused on 32 occupational specialties across the four services. This constitutes about 20 percent of the total enlisted Armed Forces. If effective job performance measures are developed for these occupations and the link to enlistment standards is accomplished, the research can be expanded to the remaining occupations. The common framework adopted by the JPM Working Group "will provide DoD and the Services with technology transfer benefits and considerable cost savings, while preserving Service-specific performance and standards assessment" (OASD, MI&L, 1984, p. 5).

NAVY PROGRAM PLANNING AND INITIATION

Background: PRIDE and CLASP

There has been a continuing effort to improve the classification and assignment tools that are available to Navy decision makers. In 1965, a computer-assisted recruit assignment system was developed to process school recommendations made by classifiers at Recruit Training Commands. In 1973, a computerized school-seat reservation network named PRIDE (personalized recruitment for immediate and delayed enlistment) was introduced at what are known as MEPS (military enlisted processing stations).

The PRIDE system operated on a first-come, first-served basis for each recruit. Analysis of the classification and assignment decisions (Kroeker & Rafacz, 1983) revealed the following characteristics: (1) Assignment options were not offered on the basis of predicted technical ("A") school success; (2) ability levels of recruits were not matched with job complexity; (3) changing Navy priorities were not accommodated in a timely fashion; (4) recruits' preferences were not taken into account in a consistent manner; (5) important administrative objectives, such as uniform minority and "A" school accession rates, were not met; and (6) recruiting goals and openings in Navy ratings were given more emphasis than the appropriateness of the rating for the recruit.

As a result, an automated classification and assignment system called CLASP (classification and assignment within PRIDE) was developed. This system was implemented in 1981. Originally, it took five factors (e.g., prediction of "A" school success) into account in an attempt to achieve the best person-job match. A sixth factor (prediction of attrition) was recently incorporated into the system (Kroeker & Folchi, 1984). By making this system more performance-based, it may be possible to further improve classification and assignment. (For a more detailed description of the operation of CLASP, see "The Initial Navy Program: Performance-Based Personnel Classification," below.)

Past Research Efforts

Past research at the Navy Personnel Research and Development Center (NAVPERS-RANDCEN) in the performance measurement area have concentrated on assessing training effectiveness and productivity. Several pilot studies initiated after the 1980

OASD (MRA&L) memorandum (see App. A) suggested that the services investigate the feasibility of validating enlistment standards against job performance. Based on results of past research and the pilot studies, a Navy JPM program to support personnel selection was planned. The initial roadmap was outlined at the Conference on Joint-Service Efforts to Link Enlistment Standards and Job Performance (OASD, MRA&L, 1982a).

NAVPERSRANDCEN and its preceding organizations have actually been active measuring performance on the job over the past two decades. Most of the job sample or simulated job tests, however, were developed in a training context. For example, one effort set up a testing and training program in which hands-on tests on actual equipment were used to diagnose individual deficiencies and assign remedial self-paced training (Anderson, Laabs, Pickering, & Winchell, 1977; Laabs, 1976; Laabs, Main, Abrams, & Steinemann, 1975; Laabs, Panell, & Pickering, 1977; Winchell, Panell, & Pickering, 1976).

Another recent effort developed computerized testing that simulated job tasks for one rating, or job (Mackie, Schultz, & Bearden, 1981). The purpose of this system was to gather performance data from individuals and provide feedback on group performance to the training commands so they could revise their curriculum.

Navy research on productivity has also depended heavily upon the objective measurement of job performance. For example, the incentive programs that were set up for keypunch operators in naval shipyards depended upon a count of the number of records typed and the number of errors (Nebeker & Nocella, 1979).

In a recent review of NAVPERSRANDCEN research efforts in job performance testing, Pickering and Bearden (1984) concluded, among other things, that (1) procedures for developing and administering job performance tests needed improvement, (2) not enough is known about the degree of simulation required to measure the capability to perform various types of job tasks, and (3) there has been a lack of systematic studies demonstrating the cost-effectiveness of job performance tests. They also recommended that job performance tests be developed to validate ASVAB composites for those critical tasks where no other adequate job performance measures exist.

Pilot Work

In the 1980 memorandum to the service secretaries (App. A), the Assistant Secretary of Defense (MRA&L) expressed the belief that enlistment and assignment standards should be based on the probability of successful job performance. The large-scale effort required to relate these standards to job performance was seen as comprising three phases: (1) demonstration of the feasibility of the project, (2) validation of current standards against job performance indices, and (3) improvement of measures of potential ability and job performance.

NAVY PILOT STUDIES

- ASVAB AND INDIRECT JPM MEASURES
  Objective: To validate ASVAB against surrogate performance measures for two ratings using personnel records
- ASVAB AND DIRECT JPM MEASURES
  Objective: To validate ASVAB against direct performance measures for two ratings using existing test instruments
- LITERATURE REVIEW
  Objective: To review all military research between the years 1952-1980 dealing with job performance prediction
- RATING SELECTION
  Objective: To produce two sets of candidate ratings, based on population size or criticality, for use in Navy's JPM program

As part of the first phase of the DoD suggested effort, the Navy conducted a literature review and several pilot studies, some of which attempted to validate ASVAB against indirect performance measures (personnel records) and against direct job performance measures using existing test instruments. They also included a review of the literature on the prediction of military job performance. In a final study, Navy ratings were ranked according to different criteria to produce two sets of candidate ratings for follow-up work in the Navy's JPM program.

Literature Review

As part of the pilot work, all military research dealing with job performance prediction for the period from 1952 to 1980 was reviewed (Vineberg & Joyner, 1982). Job knowledge tests were found to provide the most practical method for objective performance measurement in the majority of jobs. They are less expensive than job sample tests and more suitable for jobs in which incumbents are widely dispersed. Because of the high expense of developing job sample tests for ASVAB validation, the use of such tests is impractical except for jobs that require expensive training programs. Supervisory ratings of job performance were viewed as dubious in value because (1) personal variances in raters' judgments make the ratings unsuitable as objective measures of technical performance, and (2) supervisors often lack familiarity with the total job performance of the persons evaluated.

ASVAB and Indirect Job Performance Measures

Potentially, indices of job performance might be found in the enlisted personnel records. One study extracted a combined "advancement and survivability" factor from these records to be used as a surrogate measure of job performance (Simms & Hiatt, 1981). The objective was to determine how Armed Forces Qualification Test (AFQT) scores relate to advancement. It was concluded that AFQT scores could be used to predict advancement of recruits (especially those who are not high school graduates) in the Ship's Serviceman rating but not in the Electronics Technician rating.

No strong conclusions could be drawn on the basis of this limited study, so a further investigation of measures from personnel records was undertaken. An extensive data base was assembled, but it was discovered subsequently that the performance variables could not be interpreted unequivocally as measures of technical proficiency, as required by the Joint-Service research strategy.

ASVAB and Direct Job Performance Measures

One of the jobs examined in a pilot study was that of the aviation submarine warfare operator, who performs detection and classification tasks using visually presented acoustic data. Performance data were taken from a job knowledge test and a job sample test that were part of an existing evaluation program. For both job performance tests, different ASVAB composites were more valid predictors than the current selector composite that predicts training grades (Bearden, 1981).

In another pilot study, a computerized testing device originally developed to assess training effectiveness was used to test sonar technicians on several high-fidelity simulations of job tasks in submarine detection and classification. Although the current ASVAB composite was the most predictive of school performance, a different composite was most predictive of performance on the simulated tasks (Mackie, Ridihalgh, Seltzer, & Schultz, 1981).

The results of both of these pilot studies were tentative because of small sample sizes. What both point out, however, is that job performance tests and perhaps even job performance data may already be available within existing systems or data bases.

Rating Selection

In anticipation of launching a full-scale validation effort for a large number of Navy ratings, a final study was completed to aid the process of selecting the ratings to be used (Nugent, 1981). Eighty-one entry-level ratings were identified and ranked from most to least populous. The ratings were also rank ordered for criticality to mission accomplishment. These data provide information for trade-off analyses to determine whether population size or criticality of ratings should be included in the Navy's JPM program.

Initial Roadmap

The roadmap for JPM research was formulated based on past research and the recent pilot work. Since the pilot studies did not convincingly demonstrate the feasibility of setting standards based on job performance, the roadmap included aspects of all three phases suggested by OASD (i.e., feasibility investigations, validity work, and measurement).

JPM RESEARCH ROADMAP

- FRONT-END ANALYSES
  Develop job performance prediction information system.
  Identify ratings to be covered in future JPM research.
- MEASUREMENT EVALUATION
  Construct and administer performance measures.
  Develop improved methods for measuring potential ability (e.g., computerized measures).
- REVISION OF STANDARDS
  Examine CLASP for potential to incorporate a prediction of future job performance.
  Evaluate impact of proposed changes to CLASP.

The roadmap provides a framework for the systematic data gathering needed to make the Navy's operational CLASP more performance-based. It is organized around three key areas: (1) front-end analyses, (2) measurement evaluation, and (3) revision of standards. Each area includes two major research tasks, as described below.

Front-End Analyses

The first major task will develop an information system to support the prediction of job performance. It follows directly from the literature review that was part of the pilot work. It includes such actions as the review of existing data bases, including research and operational programs, for useful performance tests and data as well as for detailed task analysis information that might be used to build performance measures. All information will be catalogued by rating. The ultimate objective is a rating-specific information system that contains all findings and data applicable to relating selection and classification standards to job performance.

Another major task will identify the ratings to be covered in future JPM research. The pilot study that identified candidate ratings based on size and criticality is the starting point for this work. Also included are examinations of ways to minimize the number of ratings for which data need to be collected and to increase the sample sizes by exploiting the task commonalities that exist across ratings.

Measurement Evaluation

A major research task in this key area addresses the construction and administration of performance measures. The objectives are (1) to develop a variety of performance measures needed to supplement those discovered in ongoing research or operational programs or in existing data bases, (2) to collect performance data in the Fleet, and (3) to compare the various performance measures.

Another task in this area addresses the development of improved methods for measuring potential ability. In particular, this involves the capability of new computerized measures to predict job performance. Tests of spatial abilities represent some of the oldest selection measures in use. Paper-and-pencil tests have ignored several important dimensions of dynamic, or moving, spatial ability that can now be tested using computer presentation. Speed of information processing, measured by reaction time, is another ability that was untestable in the past but can now be tested using computers.

Revision of Standards

A major task in this area will examine the current CLASP for potential to incorporate a prediction of future job performance. The ultimate goal of this task is a new component for CLASP that is based upon the relationships between predictors and job performance.

This research area also includes evaluating any proposed changes to CLASP. One of the ways to evaluate system changes is in terms of costs calculated within a utility context. Another way is to pilot test changes in standards through simulations.

Detailed Planning

Exploratory development funds were reprogrammed in FY83 to support additional planning for JPM research to support personnel selection and to start some front-end analyses. The Navy's detailed plan was presented early in FY83 at the joint NAS Committee/JPM Working Group workshop on JPM (Laabs, 1983a). Additional planning was reported to the NAS Committee in the form of an update later in the fiscal year (Laabs, 1984). A systematic examination of alternative sources of job performance information was initiated concurrent with the planning of the Navy's initial effort (Kidder, Nerison, & Laabs, 1987).

Since a major Navy goal is to improve classification and assignment, the CLASP system provided the context for detailed research planning (Laabs, 1983b). The roadmap for JPM research guided the design of a specific research project on performance-based personnel classification, which was initiated as an advanced development project in FY84.

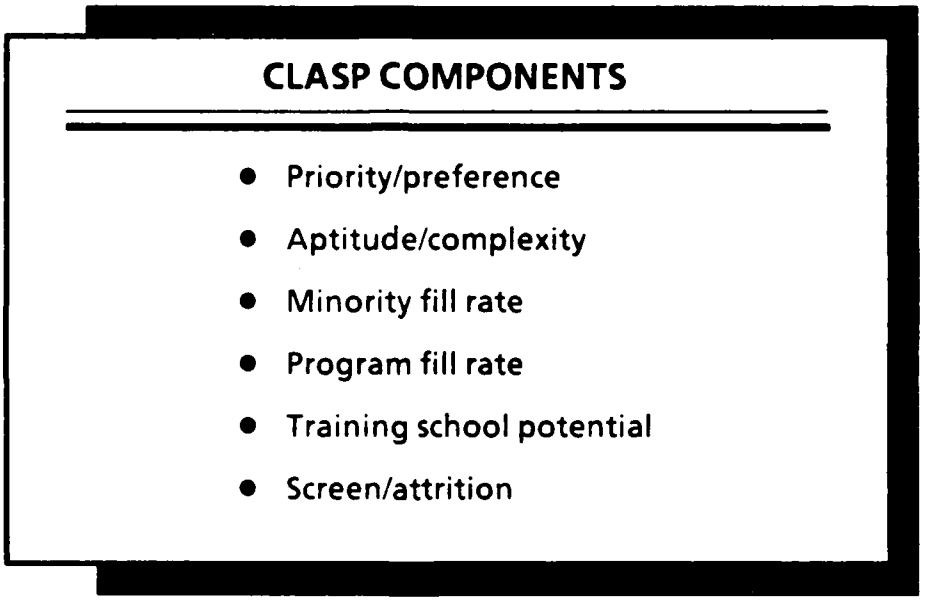
THE INITIAL NAVY PROGRAM: PERFORMANCE-BASED PERSONNEL CLASSIFICATION

As discussed earlier, the Navy's automated CLASP system is the essential link between the development of standards and the selection of personnel according to those standards. It provides the main structure for linking enlistment standards to job performance, which is the goal of the Joint-Service Project.

The CLASP system has several algorithms for matching the person to the job within constraints of fluctuating recruit quality and occupational requirements. It is a real-time conversational computer program that provides classifiers with a list of ratings appropriate for the recruit being processed.

Data describing a recruit enter the CLASP system and produce an optimality index value reflecting the match between the recruit and all ratings. A subset of ratings with the highest values is then produced. The recruit and classifier concentrate on this list of ratings, ensuring that recruits are assigned in a near optimum manner.

The optimality index is currently based on six factors: (1) the match between the manning priorities of the Navy and the preferences of the recruit, (2) the match between recruit aptitude and the complexity of the job, (3) minority representation across the ratings, (4) quotas for seats in the various "A" schools, (5) ASVAB prediction of success in "A" school, and (6) the prediction of attrition.



In order to incorporate a prediction of job performance into CLASP, the Navy needs the capability to economically measure job performance on a routine basis. This requirement provides the orientation for the Performance-Based Personnel Classification Project.

The Navy's Contribution to the Joint-Service Project

The Navy launched "Performance-Based Personnel Classification" as an advanced development effort in FY84. The main purpose is to investigate the feasibility of incorporating a performance-based factor into the current CLASP system. This is a narrower purpose than setting minimum standards for service entry, which is a long-term goal of the Joint-Service Project. Thus, the emphasis is on establishing relationships between predictors and various measures of job performance so that a recruit's potential for successful on-the-job performance ultimately can be given formal consideration in personnel classification procedures.

Overall Navy Goals

The major goal of the Navy effort is to design and develop reliable and valid job performance measures and demonstrate these measures as criteria for predictor validation. Laying the foundation for further research to improve the measurement of aptitude and job performance can be considered a secondary goal. The design, development, and fielding of the job performance tests, however, directly support the Joint-Service Project objective to develop better methods and procedures for constructing hands-on performance tests and to establish the relationships between ASVAB and job performance. It is important to note that the Joint-Service Project represents the first effort to validate ASVAB against direct performance on the job.

PERFORMANCE-BASED PERSONNEL CLASSIFICATION

- PURPOSE: Investigate the feasibility of incorporating a performance-based factor into CLASP.
- TASKS: Develop prototype job performance measurement information system.

  Identify six candidate ratings.

  Design, develop, and field job performance test and instruments.

  Investigate feasibility of a performance-based component for CLASP.

  Demonstrate potential usefulness of new predictors (e.g., new computerized tests).

Navy Research Strategy

For this initial effort, the Navy has limited the prediction of job performance to first-term personnel in three ratings that maintain and operate systems and equipment vital to mission accomplishment. Achievement of the best possible person-job match for such technical ratings is crucial because of the extremely important responsibilities and substantial recruiting and training investment.

In accordance with the Joint-Service research strategy, the Navy effort focuses on hands-on tests of technical proficiency. Since such tests are expensive and have to be fielded on a large scale to support classification and assignment validation, a concurrent

focus is on economical substitutes such as using rating scales and either paper-and-pencil or computer simulations of job samples.

The research plan follows from the roadmap for JPM research and includes three major thrusts (Laabs, 1982): Front-end analyses provide for the development of a rating-specific information system on job performance and selection of a preliminary subset of ratings for which performance measures would be developed. Measurement evaluation includes designing, developing, and fielding job performance measures (originally this included personnel-file-based measures that were subsequently eliminated) and demonstrating the usefulness of new predictors being developed in related research efforts. Revision of standards implies major operational changes in the Navy's CLASP system that cannot be made as the result of the initial research work. Therefore, this part of the research plan was limited to an investigation of the feasibility of incorporating a performance-based factor, or component, into the CLASP system.

The five project tasks are summarized below:

1. Develop a prototypic rating-specific information system to ensure that the development of job performance measures proceeds as economically as possible. Review existing programs, simulators, and data bases for useable performance data or instruments and for task analysis information that could be used in constructing performance tests. As the project progresses, add rating-specific information on the predictive usefulness of various job performance measures.

2. Identify six candidate ratings using Joint-Service criteria. Select three ratings that are critical to the Navy's mission and have a large population.

3. Design, develop, and field job performance test and instruments. These include job sample tests and substitute measurement instruments, consisting of job sample simulations and behaviorally anchored rating scales. Common tasks are to be included across the various tests and instruments in order to evaluate different methods of measuring job performance.

4. Investigate the feasibility of a performance-based factor or component for the CLASP system. Evaluate the strength of the relationship between ASVAB and the various job performance measures as a basis for adding a prediction of job performance to the system. Evaluate the relationships among the different measures to establish the potential of each of the substitute measures for routine gathering of job performance data.

5. Demonstrate the potential usefulness of new predictors currently being developed by each service. Administer new computerized predictor tests in the Fleet while the job performance data are being gathered. Establish the relationship among the new predictors, the existing ASVAB predictors, and job performance.

Types of Measures

Hands-on performance tests use actual equipment to assess technical proficiency and may involve whole- or part-task sequences. Factors considered in selecting tasks or part tasks for inclusion in the test include (1) frequency of performance, (2) feasibility of testing in a hands-on mode, (3) operational requirements, and (4) total testing time. The hands-on job sample tests are needed as benchmarks (i.e., standards) against which substitute tests can be compared.

Hands-on performance tests for critical tasks will be developed for three ratings. Such tests are extremely expensive to construct, however, because of the extensive analyses that must be done of the job, the job tasks, and the individual task steps before a valid and reliable test can be produced. Hands-on tests are even more expensive to administer because examinees must be observed with actual equipment in a one-on-one situation (usually for a minimum of one workday) and examiners must not only be job experts but must also be trained as impartial observers. Because it would be prohibitively expensive to field hands-on measures on the large-scale basis required for validation work, the Navy is investigating two types of less expensive substitute measures: simulations and rating scales (see Fig. 2).

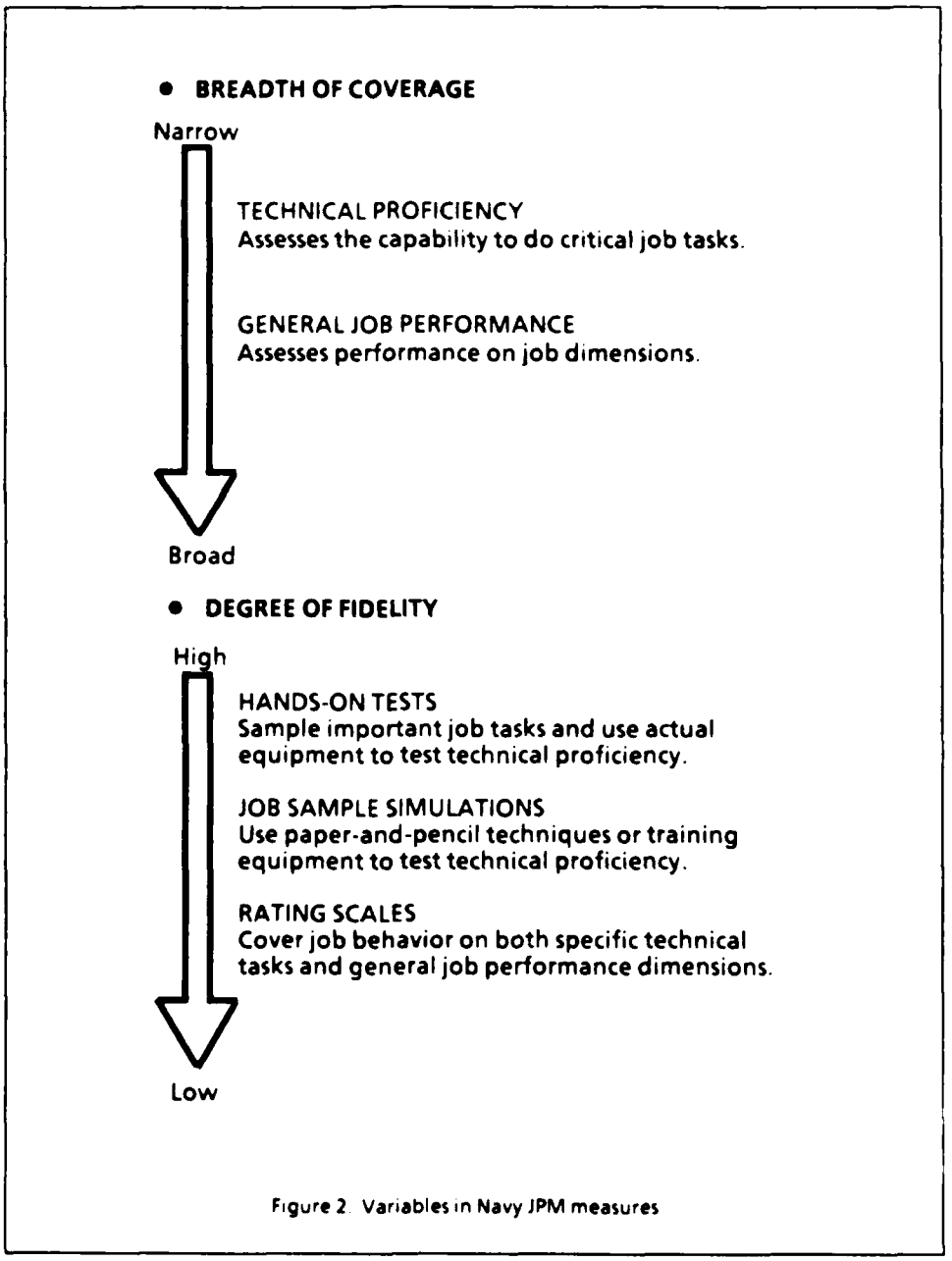


Figure 2. Variables in Navy JPM measures

One type of substitute measure uses computer-based simulation similar to that frequently employed in training programs. Instead of high-fidelity simulations, in which computers control actual equipment, this project will use lower fidelity simulations, such as computer-controlled videodisc systems or symbolic simulation. Videodisc system simulations present actual job information (e.g., pictures of equipment) and can elicit responses related to those required on the job (e.g., touching a display panel to change the position of a switch). Nevertheless, test fidelity--the extent to which the simulation resembles the performance being tested--is degraded.

Symbolic simulation, another form of job sample simulation, further degrades test fidelity because it is a paper-and-pencil test. Pictures, diagrams, and illustrations represent steps in a job task; examinees answer multiple-choice questions in reference to the visual presentations.

Another substitute for hands-on testing uses behaviorally anchored rating scales. The information for constructing these scales comes from the critical-incident technique, which identifies the behaviors that distinguish poor performers from experts. Points on these scales describe work behaviors associated with different levels of task proficiency. The rating scales will be developed at two levels: (1) the specific-task levels, a parallel to the hands-on test and simulation; and (2) the performance dimension level, which refers to broader job skills, such as "observing safety precautions," that cut across specific tasks.

Test Construction Strategy

The same general procedure will be used to develop all three types of measures for each rating under study. The steps involved are (1) identifying a set of critical tasks that adequately represent the job of the first-term enlistee; (2) designing a preliminary job sample by documentation of the task to be observed and identifying behavioral steps to be included in the hands-on test; (3) developing simulation tests using either paper-and-pencil, computer-based simulation, or both; (4) developing behaviorally anchored rating scales for specific tasks and for performance dimensions; (5) trying out individual tests and instruments, refining them, and establishing scoring procedures; (6) pretesting the entire field-test package on a small sample and training the test administrators; (7) administrating the hands-on test, simulation, and rating scales to a sample of 300 first-term enlistees; and (8) analyzing the job performance data to see if the tests and instruments can be substituted, one for another, and how the performance data are related to predictor-test data.

Pretesting Method

Two types of pretesting will be done in this project. One will involve the preliminary tryout and refinement of the individual tests and instruments; the other, the tryout of the entire field-test package. Refinement of the hands-on job sample test will add and delete tasks and part-tasks to yield a final test that requires no more than 4 to 6 hours to administer. The content of the simulation and rating scales will match the hands-on test, with refinement limited to format revisions. Administration procedures will be standardized and test observers will be trained to ensure objective scoring of the hands-on test.

FIELD TEST PACKAGE

- Hands-on performance tests
- Job sample simulations
  Paper-and-pencil simulations
  Computer-based simulations
- Behaviorally anchored rating scales (BARS)

Sampling Approach

The following sampling design issues will be considered during the development of an individualized plan for each rating:

1. The target sample size adopted by the Joint-Service Project is 300 first-term enlistees in each rating. The attainment of this goal may be limited by the number of ships or other units available for testing.

2. For each ship or unit, all first-term enlistees who are working in their rating and who have served up to 4 years in the Navy will be tested. Because of informal job specialization, the sample may have to be restricted to a subset of these first termers.

3. Information on race, sex, age, and education will be collected routinely for all examinees. The makeup of most of the technical ratings selected for study, however, will not accommodate the stratification of the sample on these variables.

Data Collection

For most ratings, the field-test package will be administered on board ship and in pier-side buildings or vans. The Navy will experience particularly difficult logistic problems in collecting hands-on performance data because sailors are widely dispersed among small and mobile units.

The total time required to test one examinee will be about 10 hours. The total time available per examinee will be divided among (1) a hands-on job sample test, taking from 4 to 6 hours; (2) a job sample simulation, taking from 1 to 2 hours; (3) a new predictor test, taking about 1 hour; and (4) sets of rating scales, taking about 1 hour. The simulation and self-ratings will be administered at the beginning of the testing period. At the same time, a set of rating scales will be administered to at least two peers and one first-line supervisor of each examinee.

Additional information, such as time on job task and personnel record entries, will be collected about each examinee. The collection of these data will require extensive liaison and coordination with each ship that participates. Periodically, a representative of NAVPERSRANDCEN who has completed the test observer training will act as a second

observer to ensure that testing continues in the field in accordance with training and to reinforce proper data collection procedures.

Data Analyses

Hands-on performance tests raise unique problems in evaluating test reliability. Since such tests are typically scored by observers, reliability depends on the objectivity of their observations. To identify and reduce observer subjectivity, test scoring procedures will be standardized and observers will be trained. During the pretest, two observers will be placed at each testing station. Test objectivity will be determined by estimating the degree of agreement among observers across examinees and tasks. In addition, the data from the pretest will be analyzed using generalizability theory designs to estimate the variance associated with observers and other facets that may affect performance scores.

The validities of the hands-on performance test and its substitutes depend on the tasks included and how well these tasks represent the job being studied. The adequacy and completeness of the job content representation, or "content validity," will be evaluated during test development.

To further evaluate the tests and instruments, the following analyses will be conducted on the data collected from the entire sample: (1) examination of the distribution of scores; (2) item analyses; (3) interobserver reliability using the data from a Navy representative as the second observer; (4) interrater reliability for peer ratings; (5) interrater reliability across self-, supervisor-, and peer-rating sources; and (6) multitrait-multimethod analyses for multiobserver data, ratings from different sources, and the three different measurement methods. A final series of analyses will use generalizability theory designs.

An additional evaluation problem is associated with establishing the rough equivalence between the hands-on performance test and the corresponding simulation and set of rating scales. Regression analyses will be used to relate performance scores to ASVAB subtest scores. The predicted criterion scores for the three different types of proficiency measures will be compared by correlating their ranking of the examinees to see whether the tests and instruments are similarly ordering individuals.

THE NAVY'S JPM PROGRAM

The Navy's Performance-Based Personnel Classification Project has expanded and evolved into the wider-ranging JPM program, as indicated in the latest annual report to Congress (OASD, Force Management and Personnel; FM&P; 1985, Ch. 5). Increased Navy and Joint-Service interest has expanded the number of ratings being covered in the project and resulted in the spinoff of two research tasks (i.e., development of a prototypic JPM data base and demonstration of new predictors) into separate projects under the JPM program.

These actions were stimulated by congressional concern for progress in the JPM area, as evidenced by letters to OASD from the Chairman of the House Armed Services Committee in 1983 and 1985 (App. C). These letters and a subsequent DoD memorandum (App. D) indicated that the Joint-Service Project holds great potential for achieving maximum performance of military manpower and requested that plans for the future implementation of JPM technology be drafted.

Research Projects

Three project areas currently make up the Navy's JPM Program: (1) a Navy JPM data base, (2) component rating projects, and (3) a performance prediction project. Each project or set of projects can be traced back to the original roadmap for JPM research. Although several of the projects started as tasks in the Performance-Based Personnel Classification Project, they now have independent funding status.

Navy JPM Data Base

The Performance-Based Personnel Classification Project initiated development of a prototypic information system containing JPM and prediction information. This system will contain references to available performance measurement instruments and devices, task analyses, and previously conducted performance measurement and prediction studies. One of the main purposes of gathering this information was to ensure that the Navy proceeds as economically as possible in developing job performance measures.

The information system will also include the job performance data collected under the project. These data, along with the other performance-related information, provide the essential structure for a JPM data base. If fully developed, the data base can be used by the research community to guide criterion development and by the operational community to answer policy questions and guide decisions. Because of the substantial interest in the JPM data base, the research task was significantly increased in scope and became a separate project.

A basic component for the data base was constructed at the Navy Training Systems Center. This work, supported in part by Joint-Service funds from the Training and Data Performance Center, evaluated a selected set of Navy training simulators as potential sources of job performance information. A computer data base and catalogue listing of apprentice-level Navy training devices has been completed (Morris, Best, & McDaniel, 1985).

The Federal Computer Performance Evaluation and Simulation Center (FEDSIM) is currently developing a life-cycle automation management plan for the JPM data base (Grizzle & Kenneth, 1986). FEDSIM is currently conducting needs analysis that will determine requirements for the JPM data base in Navy research and operational communities and propose a framework within which specific plans, policies, and procedures can be identified. The results of the needs analysis will guide the design and construction of a rating-specific prototype in the outyears of the project.

Component Ratings Projects

Improved financial support for Navy JPM research has expanded the number of ratings that can be studied in the Performance-Based Personnel Classification Project. Originally, performance measures were to be developed for only three of the six candidate ratings identified. Subsequently, an additional rating was added with the aid of supplemental funding, and the last two ratings were added with an increase in Navy funds. The six ratings now included in the project are:

1. Machinist's mate (MM)
2. Radioman (RM)
3. Electronics technician (ET)
4. Operations specialist (OS)

5. Fire controlman (FC)
6. Electrician's mate (EM)

The following rating was selected for a special Joint-Service Project demonstration:

7. Aviation machinist's mate (AD)

The AD demonstration, which is primarily supported with Navy funds, will apply Air Force job sample tests and substitutes to the corresponding Navy and Marine Corps jobs.

The seven ratings selected fit well in the Joint-Service effort because together they cover about 25 percent of the total Navy enlisted force, come from the top 26 critical Navy ratings, represent 5 of the 24 officially recognized occupational fields, and use 5 of the current 10 ASVAB composites that are in operation in the Navy's classification and assignment system.

The Joint-Service research strategy will be applied to these seven ratings--each of which is really a project in itself. After the seven projects are completed, there should be sufficient evidence to continue validation research that uses one of the substitute measures, thereby eliminating more testing with the expensive hands-on measures. The complex nature of hands-on testing is well illustrated by the job descriptions of the seven ratings being investigated:

Machinist's mate (MM): Operate, perform organizational and intermediate level maintenance on, and repair ship propulsion machinery, auxiliary equipment, and outside machinery, such as steering engine, windlasses, hoisting machinery, elevators, food preparation equipment, laundry equipment, and refrigeration and air conditioning equipment. Transfer and inventory lubricating oils. Maintain records and reports. May perform duties in the generation and stowage of industrial gases.

Electrician's mate (EM): Stand watch on generators, switchboards, control equipment, and electrical equipment. Operate and perform organizational and intermediate maintenance on power and lighting circuits, electrical fixtures, film projectors, motors, generators, voltage and frequency regulators, controllers, distribution switchboards, and other electrical equipment. Test for short circuits, ground, or other casualties. Rebuild electrical equipment, including solid state circuitry elements, in an electrical shop.

Radioman (RM): Transmit, receive, and process all forms of telecommunications through various transmission media, applying the basic principles of reliability, security, and speed in accordance with appropriate doctrinal and procedural publications. Operate, monitor, and control telecommunications transmission, reception, terminal, and processing equipment. Employ knowledge of electronic and operational system theory in applying diagnostic and restoral techniques. Perform assigned mission organizational level maintenance on telecommunications equipment and systems.

Electronics technician (ET): Perform maintenance on electronic equipment used for communication, detection, tracking, recognition, and identification, and on aids to navigation. (Exceptions: airborne equipment, data processing systems, interior communications systems, teletypewriters, sonar, dead reckoning analyzer indicators, weapons control systems, and electronic warfare systems.)

Operations specialist (OS): Function as plotters, radio-telephone and Command and Control sound-powered telephone talkers, and maintain Combat Information Center (CIC)

displays of strategic and tactical information. Operate surveillance and altitude radars, Identification Friend or Foe (IFF), and associated equipment. Serve as watch supervisors and section leaders. Interpret and evaluate presentations and tactical situations and make recommendations to superiors during watch conditions. Apply a thorough knowledge of doctrine and procedures applicable to CIC operations contained in U.S. Navy instructions and Allied or U.S. Navy publications and procedures necessary for radar navigation contained in Naval Oceanograpic Office publications. Provide command with technical information and assistance related to Anti-Surface Warfare, Amphibious Warfare, Mine Warfare, Naval Gunfire Support, and search and rescue operations. Plan, organize, direct, and administer shipboard training programs. Provide technical information and advice on capabilities, limitations, reliability, and operational readiness of CIC equipment. Advise staffs and commands on matters of operational readiness, control and use of equipment and personnel, and other matters pertaining to the operations specialist's area.

Fire controlman (FC): Perform organizational and intermediate level maintenance on surface missile and gun fire control systems and associated test equipment. Operate and test surface missile and gun fire control systems. Make detailed mechanical, electrical, and electronic casualty analyses and operate associated test equipment.

Aviation machinist's mate (AD): Maintain aircraft engines and their related systems, including the induction, cooling, fuel, oil, compression, combustion, turbine, airborne gas turbine compressors, exhaust and propeller systems, and preflight aircraft. Conduct periodic inspections on jet engines and engine-related systems. Field-test and adjust components of the engine including fuel controls, pumps, valves, and regulators. Remove, repair, and replace compressor and turbine blades and combustion chamber liners. Preserve and depreserve jet engines, engine accessories, and components. Supervise jet engine work centers.

Performance Prediction

This work will field new measures of ability in order to demonstrate their usefulness as new predictors for personnel selection and classification. Originally, this work was to be conducted late in the life of the project, but new test development technology is progressing at a very fast rate. An increasing amount of interest is being shown in the development of new predictors to supplement ASVAB, especially with the impending advent of the computerized adaptive testing (CAT/ASVAB) system. With the aid of some Joint-Service funding, this task was significantly increased in scope and became a separate project.

The research strategy of this project is to bring new, computerized ability tests into the field where performance data are being collected. The research has four major steps:

1. Examination and selection of new ability tests being investigated in each of the armed services.

2. Pilot administration of a new predictor in the field.

3. Adaptation of the selected new tests to the computer system specified by the Joint-Service CAT/ASVAB Project.

4. Demonstration of the test battery in the field across several different jobs.

The Future of JPM Technology

In a 1985 memorandum to the assistant service secretaries, the Assistant Secretary of Defense (MI&L) requested a plan for the development of JPM technology (Appendix D). This plan was to include a discussion of (1) a least-cost and a highest-cost option for extending performance measurement to the total enlisted force, (2) the transition of JPM technology to operational commands, (3) the creation of a JPM data base, and (4) the application of JPM technology to areas besides personnel selections.

FUTURE PLANS FOR JPM TECHNOLOGY

- Extension of JPM technology to total enlisted force
- Transition of JPM technology to operational commands
- Application of JPM technology to areas besides personnel selection

These topics are discussed below, based on the outline of plans that was included in the Fourth Annual Report to Congress (OASD, FM&P, 1985, Ch. 5). These plans provide a context for putting job performance data from the Navy's JPM program into a form that can be used by a variety of personnel decision makers.

Extension to the Total Enlisted Force

Detailed plans for extending JPM technology to the total Navy enlisted force cannot be finalized until a successful link to enlistment standards has been demonstrated. Therefore, initial implementation plans must be based on several assumptions.

The first is that the Navy's part of the Joint-Service Project will demonstrate a reliable and valid substitute for hands-on performance measures: that is, rating scales (the least-cost option) or computer-based simulations (the highest-cost option). The second assumption is that the effort establishes significant practical relationships between ASVAB scores and job performance data obtained from each type of instrument in the two implementation options.

It is further assumed that some clustering of ratings into job families will be necessary to cover the total Navy enlisted force even if adequate surrogates for hands-on tests are found. Testing hands-on to gather criterion data on a routine basis is prohibitively expensive and time consuming. It is not to be considered as an option.

Basic implementation of extension to the total force will require the collection and analysis of performance data from at least two ratings from each job family open to apprentices (including the seven being covered in the Joint-Service Project). The relationships between ASVAB scores and job performance data will be used to incorporate

a prediction of job performance into CLASP. The changes to CLASP will be in the form of either cutoff scores or another utility factor.

The Navy has established a formal evaluation and implementation plan to guide the extension of JPM to its total enlisted force. The following evaluation events make up this initial implementation:

1. After four component ratings are completed, a simulation study will develop cutoff scores and apply them to the ordered lists produced by CLASP. This will document the effects on the classification and assignment process and generate information on user acceptability.

2. A cost-benefit analysis of substitute measures, again after four ratings are completed, will examine the use of the substitutes on both a one-time and recurring basis. The analysis will also examine multiple uses of the performance data.

3. A systems analysis of alternative CLASP implementations will be conducted at the end of the Performance-Based Personnel Classification Project. It will outline techniques for clustering ratings and examine these alternatives: (a) cutoff scores for seven ratings only, (b) cutoff scores for "clusters" of ratings, (c) cutoff scores for all 96 ratings in CLASP, (d) a CLASP factor for clusters of ratings, and (e) a CLASP factor for all 96 ratings.

The tentative sponsors for the initial implementation are (1) the Joint-Service MAP Steering Committee, which will make the service-wide implementation decisions; (2) Deputy Chief of Naval Operations for Manpower, Personnel, and Training (OP-01); (3) Commander, Naval Military Personnel Command (NMPC-48); and (4) Commander, Navy Recruiting Command (CNRC-20). It is anticipated that the sponsors of the initial implementation will also be involved in developing a long-term JPM capability.

Transition Requirements. Any number of Navy operational commands could take on part or all of the responsibilities for periodically measuring job performance in the Fleet if a permanent JPM system were established. Alternatively, a new Navy organization could be established solely for that purpose. Final institutionalization decisions will be made by the sponsors.

As JPM technology moves from research to operation, changes in the oversight of the work must occur. Engineering research and development funds will be used to support the implementation that occurs in the early years (i.e., evaluation events), and operational funds will support the measurement work to be accomplished in the later years. If a permanent JPM system is established, operational funds will be used exclusively.

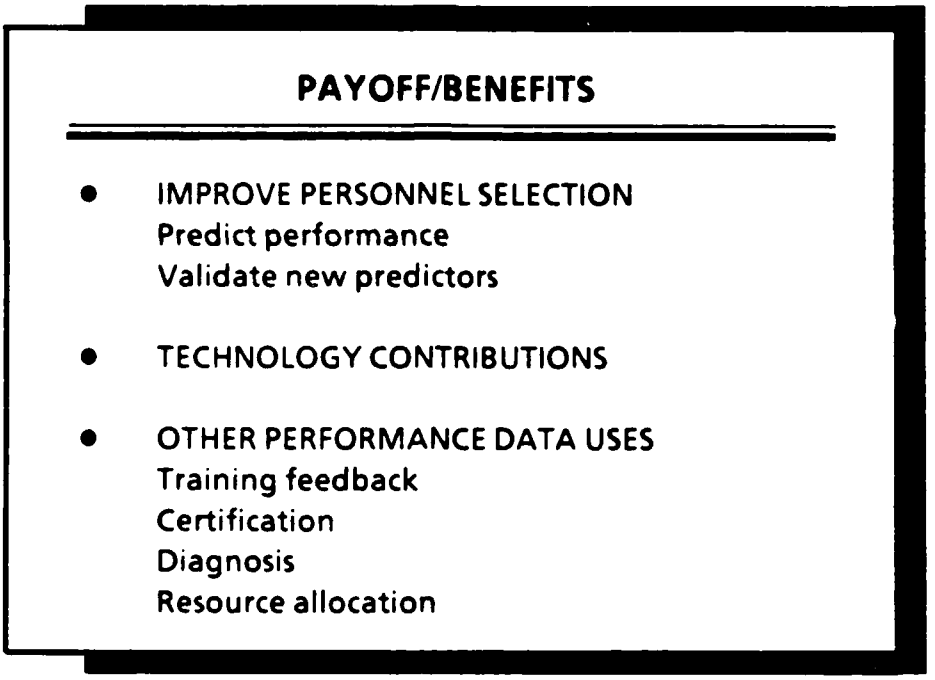
JPM Data Base

As already discussed, a rating-specific data base is part of the Navy's JPM program. The main end products will be the prototype data base and a set of plans, policies, and procedures for transferring data to a central site and for operationalizing the prototype.

Applications of JPM Technology

JPM technology can probably be applied in training assessment, curricula development, resource allocation, and in support of various personnel decisions such as advancement in rate or certification. The Navy has established an implementation planning group

made up of users and sponsors to oversee implementation and extension of JPM technology. This group will recommend specific applications based on their evaluation of the research results.



Training assessment, diagnostic testing, and certification are the most likely additional applications of JPM technology. Therefore, representatives from the Chief of Naval Education and Training (Training Appraisal Program), Naval Sea Systems Command (Shipyard Training and Certification), and the Navy Reserve Forces (Training Tracking System) are included in the group of users and sponsors. As new application areas are uncovered, appropriate individuals will be assigned to the implementation planning group.

CONCLUSIONS

One of the main end products of the Navy's JPM program will be field-tested performance measures and relationships that make it possible to predict job performance within the CLASP system. The narrowest implementation would be the institution of cutoff scores for the seven critical ratings included in the Performance-Based Personnel Classification Project that affect about 25 percent of the Navy enlisted population. The broadest implementation would cover 100 percent of the Navy enlisted population by developing a performance-based factor for CLASP. This would require additional data collection and the institutionalization of JPM in the Navy.

Another end product of the Navy's JPM program will be the advancement of technology. Easier, more economical means of measuring job performance should lead to more widespread use of this important information in a variety of personnel system functions. The JPM program will actively seek implementation and application opportunities.

The field demonstration of new computerized tests that assess abilities that have not been measurable in the past is another important end product. The predictive relationship between these tests and job performance will provide needed information about which tests, if any, are candidates to supplement the computerized ASVAB.

A final product of the JPM program will be the JPM data base. It will contain rating-specific data on technical proficiency and general job performance as well as performance-related data from past research and other data bases, systems, and programs. This information should prove useful to the research community in future criterion development efforts, and to the operation community as they go about making personnel and resource allocation decisions.

Taken together, these products will yield more optimal assignment into initial jobs and an enhanced personnel system. This will lead to (1) improvements in individual performance, with concomitant improvements in readiness; and (2) more satisfied personnel, with concomitant increases in morale, productivity, and retention.

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APPENDIX A

1980 OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE MEMORANDUM TO SERVICE SECRETARIES

ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

MANPOWER
RESERVE AFFAIRS
AND LOGISTICS

JUL 7 1980

MEMORANDUM FOR Secretary of the Army
Secretary of the Navy
Secretary of the Air Force

SUBJECT: Plan for Validating Enlistment Standards Against Job Performance

I believe the Department of Defense should base its standards for enlistment and for assignment to a military specialty upon the probability of successful job performance later in a person's military career. Therefore, I am asking the Services to undertake an effort, in cooperation with OSD, to establish standards for enlistment and assignment to training that are validated against eventual job performance. In this context, validation of a proposed enlistment or assignment standard means demonstrating that enlistees meeting it have a reasonable probability of eventually attaining acceptable levels of job performance.

The overall effort will be divided into three phases; 1) a pilot project to demonstrate the feasibility of setting standards based on the above criteria, 2) a long-term program to establish and validate standards, and 3) a long-term research effort to improve DoD's measures of potential ability and job performance.

Pilot Project

My staff will continue its study of Army enlistees in order to demonstrate the feasibility of setting enlistment and assignment standards based on existing performance standards. The effort will focus on the military specialty of infantryman. This occupation was chosen because it is critical to the Army's mission, has a large number of entrants each year, and has a well developed Skill Qualification Test (SQT) with over 9,000 test results available for analysis. My staff will consult with the Army on this pilot project and may ask for some additional data. They may also visit some Army installations and employ appropriate contractual support in completing this task. I have asked them to complete the pilot project by September 30, 1980.

I am also asking each Service to begin a similar pilot project for one military occupation. These projects should be completed by September 30, 1980. The independent pilot projects should be coordinated among the Services and with OSD to ensure an exchange of information and mutual assistance. My staff will periodically request informal progress reports from the Services on these pilot projects.

I have attached an outline of how my staff intends to approach this pilot project on validation. I expect that the final report would follow this outline. I suggest that the Services adopt this same approach aiming toward a similar final report this fall, and that we work together to refine this methodology during the course of our pilot effort. I recognize that within the time available to do the pilot project it may not be possible to develop all the data called for by the outline with the degree of precision I would like. Our plan is to use the best estimates available, and document them; I encourage the Services to do the same.

Mr. Robert A. Stone, Deputy Assistant Secretary of Defense (Program Management) will be in charge of this project within the Office of the Secretary of Defense, and will coordinate the Service efforts. He will have a meeting shortly with your representatives to discuss this project and to explain how the OSD work will proceed.

Long-Term Effort to Validate Enlistment Standards Against Job Performance

Assuming that our pilot projects show that it is possible to link enlistment and assignment standards to job performance, the Services should initiate in October 1980 a long-term project to do this. The aim of the project will be to either validate, or revise as necessary, current enlistment and assignment standards for at least 75 percent of the accessions entering training. The initial work should concentrate on using current ASVAB scores and existing performance measures. As better measures are developed through the concurrent research effort, the standards should be updated to improve our ability to select people for specific types of training. Each analysis of a proposed standard for a military occupation should specifically examine the trade-off between the costs associated with failure rates of low aptitude people vs. the cost of recruiting higher aptitude people in order to reduce the failure rate. Each revised standard should be submitted for my approval prior to implementation. I plan to develop a mechanism, in cooperation with the Services, to monitor the progress on this long-term effort. My goal is to have the effort completed by the end of FY 1983.

Long-Term Research Program

Both the pilot projects and the long-term validation effort will of necessity deal at first only with existing tests and performance measures. However, the Department needs to start now to develop improved methods for measuring potential ability and job performance. Therefore, the Services should plan to initiate or re-orient research work in this general area and insure that adequate resources are provided to address this problem starting in FY 1981.

The Services should request their personnel research laboratories to begin research projects for specific occupations. This research would then become input to the long-term effort to validate standards. The initial phase of the research effort, in addition to providing the underpinning for future research, would be in support of the skills selected for validation in the long-term effort.

APPENDIX B

1983 MANPOWER ACCESSION POLICY STEERING COMMITTEE ENDORSEMENT

1. TITLE: Joint-Service Efforts to Link Standards for Enlistment to On-The-Job Performa

2. STATEMENT OF NEED: The Services, in cooperation with DoD, have undertaken an effort to develop job performance measures for individuals and Army units and to test the feasibility of linking enlistment standards to job performance information. In order to achieve these goals, job performance measures must be developed. Accordingly, the Manpower and Accession Policy Steering Committee (MAPS) endorses the following research game plan and description of Service responsibilities and urges Service support of research funding requirements and field test data acquisition activities. All timelines are based on the availability of projected funding and resources. The Project game plan can be summarized as follows:

a. The Services will identify a set of cross-Service and Service-specific specialties (MOSs, AFSs, Ratings) which will serve as the initial test bed for the development of job performance measurement strategies. (Timeline: to be completed by June 1983)

b. Service-specific funds will be used to establish a set of hands-on and surrogat measures. (Timeline: FY 1983-1986)

1) It is projected that the first set of hands-on and surrogate tests will be ready for demonstration in FY 1984.

2) Each Service will develop specialized expertise in the following particular aspects of the Joint-service performance measurement development effort and agrees to share whatever techniques are found to be most valid and efficient. (Timeline: results for initial skills in FY 1985)

a) Army: Army-wide performance measures, MOS-specific job knowledge paper-and-pencil tests, unit performance.

b) Air Force: Walk-through testing procedures, ratings of job experience.

c) Navy: Simulator and training device performance tests, symbolic simulation substitute tests.

d) Marine Corps: Identifying and monitoring peripheral data collection.

3) In addition, each Service will act as the "lead Service" in demonstrating job performance measures for one cross-Service military specialty. (Timeline: data collection complete for first set in FY 1985).

c. Joint-Service 6.4 funds (PE 64722A and PE 64709N) may be used by the Services to support fielding and demonstrating the administration of prototype hands-on and surrogate tests and data analyses. In addition, individual performance measurement development efforts will be coordinated and cross-walked with Joint-Service activities evaluating Army unit performance using instrumented ranges. (Timeline: initiate in FY 1984, complete in FY 1986)

d. Appropriate Service-specific data banks will be established within each Service support job performance data collection and analysis efforts. Within guidelines establi and agreed to by the Services, this information will be shared and stored centrally with the Department of Defense. (Timeline: initial phase complete FY 1986)

3. BACKGROUND: The House Armed Services Committee and the House Appropriations Committe have both endorsed this effort. In addition, the HAC has directed OSD to provide manage ment oversight and asked that DoD and the Services submit an annual report of progress each December. The Services and OSD need to provide adequate support to ensure the Congressional mandate is addressed and achieved in the time frame expected (i.e., testin the feasibility of linking enlistment standards to job performance no later than the end of FY 1986).

4. APPLICATION OF RESULTS: This is an important technical undertaking which could signi ficantly improve the Services' ability to match people and jobs more efficiently, increa technical training and subsequent job performance, and provide information which could facilitate identification of training requirements for new weapons systems and the devel opment of new training programs.

5. PRIORITY: 1

6. POINT OF CONTACT: Lt. Col. Charles. R. Curran, OASD(MRA&L), Extension 7-9271.

7. ENDORSEMENT: The undersigned members of the Manpower Accession Policy Steering Committee endorse the game plan for the Joint-Service job performance measurement research pr ram and encourage DoD/Service support for funding and data collection efforts.

G. Thomas Sicilia

Dr. G. Thomas Sicilia
Director of Accession Policy
OASD(MRA&L)

Jack B. Scheler

Major General H. N. Schwarzkopf
Director of Military Personnel
Management
for HQ, Department of the Army

A. J. Herberger

Rear Admiral A. J. Herberger
Director of Military Personnel
Policy Division
Office of the Chief of Naval
Operations

Kenneth L. Peek Jr

Major General K. L. Peek, Jr.
Director of Personnel Plans
HQ, U.S. Air Force

A Lukeman

Major General A. Lukeman
Director of Manpower Plans and
Policy Division
HQ, U.S. Marine Corps

APPENDIX C

1983 AND 1985 U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON ARMED SERVICES LETTERS TO THE OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE

U.S. House of Representatives
COMMITTEE ON ARMED SERVICES
Washington, DC 20515

February 25, 1985

Honorable Lawrence Korb
Assistant Secretary of Defense
The Pentagon
Washington, D.C. 20301

Dear Larry:

Thank you for sending me your December 1984 report, "Joint-Service Efforts to Link Enlistment Standards to Job Performance." As you know, I have followed this project with interest and am pleased to note the progress made.

After reviewing the report, I would appreciate answers to the following questions by April 1.

1. Why is the Navy's funding for job performance measurement research so low relative to the other services? Does the Navy's funding somehow reflect a lack of commitment to the project?

2. What are the criteria Defense will use to determine if this project is a success and should be made operational? When will these criteria been applied to make a go/no go decision?

3. Assuming the project is successful for the 20 percent of the force being considered, what are the plans to cover the remaining 80 percent? Are there funds programmed for the next phase?

4. What are the Department of Defense's plans for applying this job performance data to areas of personnel management (e.g., training course design and evaluation, promotion appraisal, career development, etc.) other than setting enlistment standards?

5. Is there still a Navy Tri-Service PE in this area? I wrote the Department about this very issue and my support for these joint service R&D efforts September 20, 1983 (See attachment).

I continue to believe that personnel selection and job classification is an area that can be improved with the result being lower attrition, higher morale and productivity, and thus increased cost savings. At a time when both Defense and the Congress must ensure wise stewardship of financial resources, this project holds great potential for enhancing the utilization of military manpower.

Sincerely,

Les Aspin
Chairman

LA/wnd
Attachment

U.S. House of Representatives

COMMITTEE ON ARMED SERVICES

Washington, D.C. 20515

NINETY-EIGHTH CONGRESS

MELVIN PRICE (ILL.), CHAIRMAN

September 20, 1983

Honorable Caspar W. Weinberger
Secretary of Defense
The Pentagon
Washington, D. C.

Dear Mr. Secretary:

The recent conference on the Defense Authorization Act for Fiscal Year 1984 eliminated funding for joint-service personnel and training research programs (Program Elements 64709N and 64722A) which Congress had previously endorsed and instructed the Department of Defense to conduct with all due speed. I am particularly concerned, because two very critical joint service efforts to link enlistment standards to job performance and to develop a computer adaptive testing system were largely funded by these program elements. Both of these programs, as well as the other manpower and training initiatives covered by these funds, have tremendous potential to improve significantly the ability of the services to meet manpower and training objectives in an era of increasing weapons sophistication and decreasing youth cohort size.

The elimination of these funds was an unfortunate consequence of the turmoil and time constraints surrounding the conference. I would not take it as a signal that those of us who deal with manpower requirements are now less interested in these important joint-service personnel and training projects. We remain concerned and interested in the successful completion of these projects. As a result, I would respectfully ask that the Department of Defense ensure that adequate funding for joint-service personnel and training programs be included and fenced (e.g., made items of special interest) in next year's (fiscal 1985) budget to cover promising personnel and training technology demonstrations, including the enlistment standards/job performance and computer adaptive testing programs. I will vigorously support these funds during next year's authorization activities.

I sincerely appreciate your efforts to ensure that these important joint-service research projects appear in the fiscal year 1985 Department of Defense budget.

Sincerely,

Les Aspin
Chairman, Military Personnel
and Compensation Subcommittee

LA:wnw
copies to:
Honorable Lawrence J. Korb
Honorable Richard D. [illegible]

APPENDIX D

1985 OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE MEMORANDUM TO ASSISTANT SERVICE SECRETARIES

THE ASSISTANT SECRETARY OF DEFENSE

WASHINGTON D C 20301-4000

6 MAY 1985

MANPOWER
INSTALLATIONS
AND LOGISTICS

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (M&RA)
ASSISTANT SECRETARY OF THE NAVY (M&RA)
ASSISTANT SECRETARY OF THE AIR FORCE (MRA&I)

SUBJECT: Joint-Service Job Performance Measurement/Enlistment Standards Project

In a February 25, 1985 letter (shown at Tab A), Congressman Les Aspin asked several questions regarding future directions of the Joint-Service Job Performance Measurement/Enlistment Standards Project. On April 10, 1985, I responded (Tab B) by indicating that OSD and the Services would work cooperatively to develop plans and funding proposals for applying job performance measurement (JPM) information to areas of personnel management other than setting enlistment standards. The purpose of this memorandum is to initiate actions related to my commitment to Mr. Aspin, and to provide you with guidance for developing plans for the future of JPM technology.

Accordingly, I would appreciate your preparing a plan for the development of JPM technology. This plan should address the following issues and their related costs: (1) extending JPM measures and enlistment standard linkages to the total force; (2) institutionalizing JPM data development; (3) creating a centralized data base for JPM information; and (4) exploring applications of JPM technology to other manpower policy areas.

Your plans should take into account the following guidelines:

(a) Although detailed plans for extending JPM technology to the total force cannot be finalized until successful linkage to enlistment standards has been demonstrated, programming cycles demand that future funding requirements be estimated. Each Service should assume that the demonstration project is successful and, in that light, develop both least-cost and highest-cost options that will permit extension of performance measurement to the rest of the force.

(b) Plans for transitioning JPM technology beyond the research phase should make provisions for identifying: organizational responsibilities for long-term JPM development within each Service, funding and policy changes needed to make this happen, and a timetable for key milestones.

(c) Plans for creating a JPM data base should indicate how and when each Service plans to establish common data elements and formats, policies on release and use of data, and a timetable for transferring data from Service data bases to a central Defense Training Data and Analysis Center data base.

(d) The Services are encouraged to consider any application of JPM technology with the potential for improving manpower, personnel and training procedures. Such areas as training curricula development and evaluation, and reenlistment standards-setting would appear to be among the more promising areas. Plans should also include proposed changes to the current management structure of the Joint-Service Project to facilitate the transition of current JPM technology to these new areas.

I would appreciate receiving your plans by September 1, 1985, so as to permit their review and discussion at the fall quarterly meeting of the Joint-Service Job Performance Measurement Working Group. I would also expect that the Services would include the plans in their respective chapters of the forthcoming Fourth Annual Report to Congress, scheduled for submission in December 1985.

Lawrence J. Korb
Assistant Secretary of Defense
(Manpower, Installations & Logistics)

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